

### REMARKS/ARGUMENTS

The above-identified patent application has been amended and reconsideration and re-examination are hereby requested.

The Examiner correctly indicated that in Hirota et al., the temperature  $t_2$  (lower case t) is a measured temperature. However, the temperature  $T_2$  (capital T) is not a measured temperature. The temperature  $t_2$ , i.e., the measured temperature of Hirota et al., is not measured in response to the detected exothermic reaction as set forth in claim 12. ***Thus, Hirota et al., do NOT inject a hydrocarbon into the reaction in accordance with the measured temperature of an output of the catalyst in response to detection of exothermic reaction.*** To put this still another way, with Hirota et al., hydrocarbon injection is not based upon the measured temperature of the catalyst when an exothermic reaction is detected.

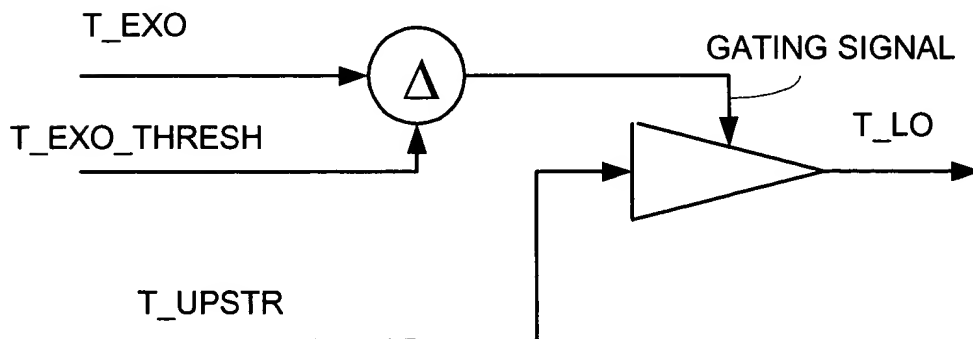
The diagram below is representative of a portion of applicant's method and system:

### INVENTION

$T\_EXO\_THRESHOLD$  is a reference temperature

$T\_UPSTREAM$  is a temperature at the output of the catalyst

$T\_LO$  is the MEASURED temperature value of  $T\_UPSTR$  when  $T\_EXO$  exceeds  $T\_EXO\_TRESH$  and therefore  $T\_LO$  is a MEASURED temperature



Note that an exothermic reaction across the catalyst is detected (i.e.,

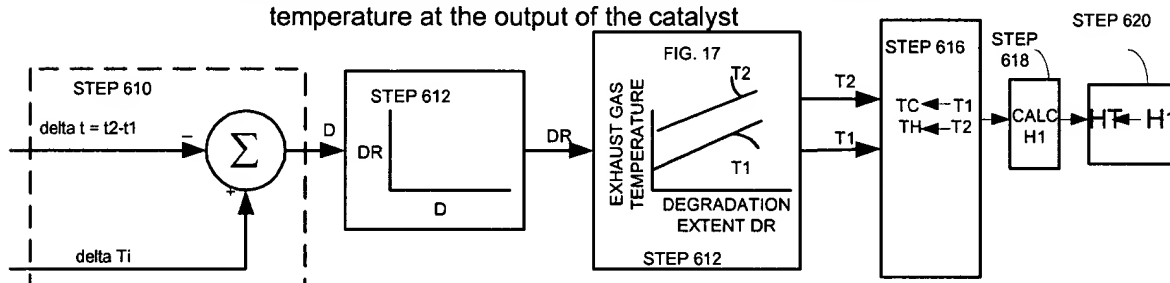
when  $T\_EXO$  exceeds  $T\_EXO\_THRESH$ ) is detected and the temperature of an output of the catalyst ( $T\_UPSTR$ ) is measured (i.e, the temperature  $T\_LO$  is the measured temperature at the output of the catalyst when  $T\_EXO$  exceeds  $T\_EXO\_THRESH$ ). Hydrocarbon is injected into the reaction in accordance with the measured temperature ( $T\_LO$ )

The diagram below is a representation of the system and method of Hirota et al.

HIROTA ET AL.

$t1$  and  $t2$  are measured temperatures and thus  $\Delta t$  is the difference between two measured temperatures

$T2$  is the upper limit of a temperature RANGE, it is NOT a measured temperature at the output of the catalyst



As noted above,  $t2$  is a measured temperature and  $T2$  is NOT a measured temperature. Clearly, Hirota et al., do NOT measure a temperature of an output of the catalyst in response to "the detected exothermic reaction". Thus, Hirota et al. do NOT inject the hydrocarbon into the reaction in accordance with the "measured" temperature as set forth in claim 12.

Thus, Hirota et al., do NOT inject a hydrocarbon into the reaction in accordance with the measured temperature of an output of the catalyst in response to detection of exothermic reaction. To put this still another way, with Hirota et al., hydrocarbon injection is not based upon the measured temperature of the catalyst WHEN an exothermic reaction is detected (i.e., in response to detection of).

With regard to claim 1, the Examiner has taken the position that it is obvious that the exotherm referred to in Hirota et al. is generated by the combustion of hydrocarbons. Without arguing that point, we reiterate that claim 1 includes "injecting the hydrocarbon into the

engine exhaust in accordance with detection of a light-off *event*". *Claim 1 is not stating* "injecting the hydrocarbon into the engine exhaust in accordance with *detection of an exotherm*". The light-off event is illustrated on page 5 of this response, and is the event where the exotherm crosses a certain threshold; that is, when *T\_EXO exceeds T\_EXO\_THRESH*. The exotherm, *T\_EXO*, is an input to detection of the light-off event, not the event itself. The light-off event is when *T\_EXO exceeds T\_EXO\_THRESH not T\_EXO*. Claim 1 points out that hydrocarbon is injected in accordance with detection of a light-off EVENT, not with an input used to detect such event. Also, the examiner uses the term "isotherm" at the top of page 8, however it has been assumed that the appropriate term is "exotherm".

**Considering the claims:**

Claim 4 has been amended to point out that the method includes detecting a temperature of the catalyst in response to the detected exothermic reaction; and injecting the hydrocarbon into the reaction in accordance with the detected temperature. (emphasis added)

Claim 5 has been amended to point out that the method includes determining an exothermic condition temperature upstream of the catalyst when the temperature difference is determined to exceed the threshold and comparing the determined exothermic condition temperature with an exothermic condition temperature expected from the catalyst at a time prior to the determined exothermic condition temperature.

Claim 6 has been amended to point out that the method includes: (a) detecting a pair of temperatures across the catalyst, such pair of temperatures providing a temperature difference across the catalyst; (b) comparing the temperature difference with a predetermined temperature threshold; and (c) determining an exothermic condition temperature when the temperature difference is determined to exceed the threshold, such exothermic condition temperature being determined from one of the pair of detected temperatures.

Claim 7 has been amended to point out that the system includes a processor for controlling the hydrocarbon injector in response to the pair of sensors, such processor being programmed to:

determine an exothermic condition temperature from one of the pair of sensors when the difference in the common parameter is determined to exceed the threshold;

compare the determined exothermic condition temperature with an exothermic condition expected from the catalyst at a time prior to the determined exothermic condition temperature; and

compare a difference in the common parameter detected by the pair of sensors with a predetermined threshold;

Claim 9 has been amended to point out that the system includes a processor being programmed to:

provide a control signal to a hydrocarbon injector to inject the hydrocarbon into the exhaust upstream in response to output signal from a pair of sensors, each of the pair of sensors being adapted detecting a common parameter in the exhaust, one of such sensors being upstream of the catalyst and the other one of the sensors being downstream of the first sensor, such control signal being provided by steps comprising:

comparing a difference in the common parameter detected by the pair of sensors with a predetermined threshold;

determining an exothermic condition temperature from one of the pair of sensors when the difference in the common parameter is determined to exceed the threshold;

comparing the determined exothermic condition temperature with an exothermic condition expected from the catalyst at a time prior to the determined exothermic condition temperature; and

modifying the injected hydrocarbon in accordance with said last-mentioned comparing.

Claim 10 has been amended to point out that the method includes comparing a difference in a common parameter detected by a pair of sensors with a predetermined threshold, one of such sensors being upstream of the catalyst and the other one of the sensors being downstream of the first sensor; determining an exothermic condition temperature from at least one of the pair of sensors when the difference in the common parameter is determined

to exceed the threshold; comparing the determined exothermic condition temperature with an exothermic condition expected from the catalyst at a time prior to the determined exothermic condition temperature; and modifying the injected hydrocarbon in accordance with said last-mentioned comparison.

Claim 12 has been amended to point out that the method includes (a) detecting an exothermic reaction across the catalyst; (b) measuring a temperature of the catalyst in response to the detected exothermic reaction; and (c) injecting the hydrocarbon into the reaction in accordance with the measured temperature.

Claim 13 has been amended to point out that the method includes (a) detecting a pair of temperatures across the catalyst, such pair of temperatures providing a temperature difference across the catalyst; (b) comparing the temperature difference with a predetermined temperature threshold; and (c) determining a temperature of the catalyst when the temperature difference is determined to exceed the threshold, such determined temperature being obtained from at least one of the detected temperatures.

In the event a petition for extension of time is required by this paper and not otherwise provided, such petition is hereby made and authorization is provided herewith to charge deposit account No. 50-0845 for the cost of such extension.

Application No.: 09/682,443  
Amendment accompanying RCE

In the event any additional fee is required, please charge such amount to Patent and  
Trademark Office Deposit Account No. 50-0845.

Respectfully submitted,

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Date

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